Received 4/18/94 EPA

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COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
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April 7, 1994

Ms. Doris Betuel
U.S. EPA Region 9 (W-6-2)
Groundwater Pollution Control Section
75 Hawthorne Street
San Francisco, CA 94105-3901

Attn: Ms. Shannon FitzGerald

Dear Ms. Betuel:

SUBJECT: LAHAINA WASTEWATER RECLAMATION FACILITY
EPA UIC PERMIT APPLICATION ADDITIONAL DATA

This letter is in response to your request for additional information regarding the subject permit application. The items which were requested and enclosed are as follows:

Attachment #1	Customized plugging and abandonment plan.
Attachment #2	Tidal fluctuations and their effect on the injection wells.
Attachment #3	Injection well workovers, cleanings, and wellbore problems,
Attachment #4	Information that delineates the USDW below the Lahaina WWRF. (salinity profile of wells)

We look forward to your review of this supplemental information. Should you have any questions call Michael Ratte at (808) 879-5017.

Sincerely,

George N. Kaya, Director
Department of Public Works
County Of Maui, Hawaii

MR(94409.uic)
Enclosures

c: Thomas Arizumi, DOH
Mayor Linda Crockett Lingle

ATTACHMENT #4

DELINEATION OF THE USDW BELOW THE LAHAINA WWRF - SALINITY PROFILES

Enclosed is a geologic/hydrologic evaluation of the Lahaina WWRF. Included with this study is a depth specific conductivity study, a depth specific salinity study, and a water quality analysis for samples collected at the surface, and at a depth of 180'.

they have not been reproduced for this report.

Analysis of the geologic and drillers logs from these exploratory holes has provided two findings of particular significance for this project. First, the injection potential of the strata penetrated by the exploratory wells looks very promising. Although a quantitative evaluation of the rock permeability, and hence injection capacity, could not be obtained from the small-diameter exploratory wells, and must await the pumping/injection testing of the actual injection well, from a purely qualitative standpoint the rock permeability appears to be acceptable. Secondly, the geologic and drilling logs provide a good basis for selecting the various injection well parameters such as well diameter, depth, and casing schedule. This information is discussed in the later section on Injection Well Design.

HYDROLOGIC DATA

Hydrologic data collected from the 2 exploratory wells includes water level information (depth to water and water level fluctuations) and water quality information (salinity and electrical conductivity profiles and chemical analyses).

Analysis of the water level data indicates: (1) the groundwater body in this area is unconfined, (2) the depth to the water table in exploratory well #1, approximately 25 ft from the first proposed injection wells, is 29.5 ft below the top of the well casing (the top of the casing is approximately 1.5 ft above ground surface so the water table is about 28 ft below ground level; the precise elevation of the 2 exploratory wells has not yet been surveyed in and this should be done to establish the position of the groundwater surface with respect to sea level), and (3) short-term fluctuations (probably tidal-induced) of the water table in the 2 exploratory wells appear to be on the order of only 1-2 inches (based on 7 days of continuous water level recording and 12 hours of periodic water level measurements in well #1 and 6 hours of periodic water level measurements in well #2). These findings are significant for 2 reasons. First, the approximately 28 ft depth to the water surface sets an upper limit on the allowable injection head buildup, and secondly, the lack of significant tidal response in these wells indicates that short-term periodic water table fluctuations should not pose a problem at this site. Longer-term seasonal and annual fluctuations also are not anticipated to be significant.

Salinity and electrical conductivity profiles taken from exploratory well #1 are shown in Figures 3a and 3b, and chemical analyses of samples taken from the top of the groundwater body and from a depth of 180 ft in exploratory well #1 are

given in Table 1. The in-situ salinity and conductivity profiles extend only to a depth of 100 ft owing to equipment limitations. The values for the 160 ft depth were taken on a sample collected from that depth and brought to the surface for analysis. It can be seen that the salinity at 100 ft is more than 60% of sea water (salinity of seawater is about 35°/oo), and the salinity at 160 ft is about 80% seawater. No samples were collected from well #2 for chemical analysis, however, conductivity and salinity profiles run on well #2 were very similar to those from well #1.

The above-described water quality data are significant for several reasons: (1) they indicate injection will be into brackish and saline waters and should not jeopardize potable water bodies; (2) because the injected effluent, which has a density similar to that of fresh water, will be injected into denser high-salinity groundwater, the effluent can be expected to migrate upward in response to buoyant forces, as well as outward from the well, and (3) the water quality data collected at this time and presented in Figures 3a and 3b and Table 1 will provide pre-injection baseline data for comparison with later post-injection data.

INJECTION WELL DESIGN

Provisions for the construction and testing of the injection well(s) are described in detail in the enclosed Special Provisions for Lahaina Sewer System and Wastewater Reclamation Plant Effluent Disposal Well. The most significant points, especially those that have undergone modification are summarized below:

1. Number of Injection Wells: It is recommended that at least 2 injection wells be constructed. The final injection capacity and injection head build-up will not be known until the first injection well is constructed and tested, and at that time a final decision can be made of the number of wells required. However, even if a single well initially can handle the entire effluent load, a second well should be available at all times on a standby basis to handle any contingencies such as changes in the injection schedule, reductions in injection capacity, system failures, etc.
2. Well Location: The first two injection wells (and this should be all that are required) will be located as originally planned.
3. Well Diameter, Depth, and Casing Schedule: These are all specified in the Special Provisions document, however, the rationale for setting the casing and total well depth is of special significance. The casing depth of 85 ft was selected to allow setting the casing in the very dense impermeable layer which occurs between about 75 to 95 ft depth in exploratory well #1. The total well

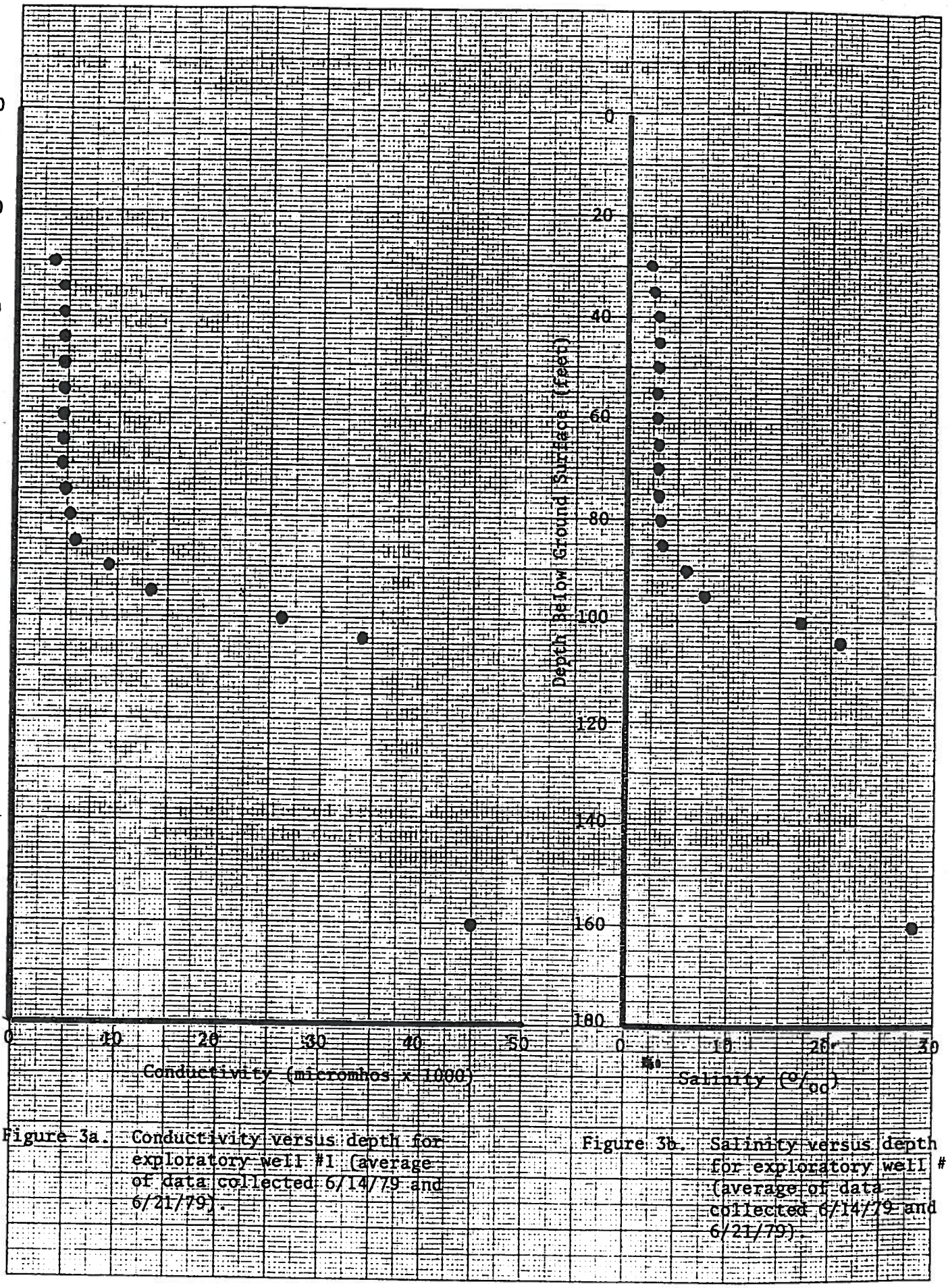

Figure 3a. Conductivity versus depth for exploratory well #1 (average of data collected 6/14/79 and 6/21/79).

Figure 3b. Salinity versus depth for exploratory well # (average of data collected 6/14/79 and 6/21/79).

Table 1. Water quality analyses for samples collected at the water surface and at a depth of 180 ft in exploratory well #1.

Constituent	Water surface	180 ft depth
pH	6.9	7.8
Chloride, mg/l	580	26,000
Alk as $CaCO_3$, mg/l	124	100
TDS, mg/l	1298	32,228
TSS, mg/l	59.5	90
NH_3-N, mg/l	sample too old	sample too old
NO_{2+3}-N, mg/l	" " "	" " "
Phosphate, mg/l	0.01	0.01
Iron (Fe), mg/l	---	---
Manganese, mg/l	0.5	1.0
Sodium, mg/l	180	237
Potassium, mg/l	6.6	350
Calcium, mg/l	59.1	83.3
Magnesium, mg/l	46.3	189.3
Copper, mg/l	0.05	0.15
Zinc, mg/l	0.08	0.33

Remarks: Samples collected several days before they could be analyzed, thus several of the constituents could not be reliably analyzed, most notably nitrates, phosphates, and alkalinity